22. (New) The process of Claim 10, wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%.

REMARKS

With this amendment, Claims 2-5 and 7-10 are amended, and Claims 11-22 have been added. Claims 1 and 6 are cancelled. Claims 2-5 and 7-22 are thus presented for further Examination.

The specific changes to the specification and the amended claims are shown on a separate set of pages attached hereto and entitled VERSION WITH MARKINGS TO SHOW CHANGES MADE, which follows the signature page of this Amendment. On this set of pages, the insertions are underlined while the ~~deletions are stricken through~~.

Rejections Under 35 U.S.C. § 112

The Examiner has rejected Claims 2-5 and 7-10 under 35 U.S.C. § 112, second paragraph as failing to particularly point out and distinctly claim what is regarded as the invention.

In particular, the Examiner has rejected Claim 2 as being an improper hybrid claim. Claims 2-5 have been amended to that they are not dependent on a product claim.

Claims 2-5 and 7-10 were rejected for not having actively recited steps. Claims 2-5 and 7-10 have been amended to have actively recited steps.

The Examiner rejected Claims 2, 3, 7, and 8 because the minimum holding time was zero hours. Claims 2, 3, 7, and 8 have been amended to clarify that the original language of "maintaining" the temperature means a minimum holding time of more than zero hours.

The Examiner also rejected to the claims because it was not clear if "at least" referred to only 0.3% or the entire range 0.3-1.5%. The claims have been amended in accordance with the examiner's suggestions.

Accordingly, Applicants respectfully request withdrawal of the rejections.

Rejections Under 35 U.S.C. § 103

The Examiner has rejected Claims 2-4 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,286,316 to Wade in view of JP 61-119645A (JP '645). The Examiner has also rejected Claims 2-4 under 35 U.S.C. § 103(a) as unpatentable over Wade in view of JP '645 and further in view of the "Metals Handbook: Desk Edition", p. 428. The Examiner has rejected Claims 2 and 4 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 3,990,922 to Gullotti in view of JP 61-052346 (JP '346). The Examiner has also rejected Claim 2 under 35 U.S.C. § 103(a) as unpatentable over JP '346.

Wade and Gullotti describe homogenizing processes performed prior to extrusion, while JP '645 and JP '346 are directed to port hole extrusion processes.

The preferred embodiments of the present invention result in reduction of preferential corrosion in the welding portion by previously precipitating a Mn-containing compound with a homogenizing treatment of the ingot before extrusion. As shown in Table 7, the preferential corrosion of the preferred embodiments is significantly improved with the processes of the preferred embodiments. Tables 12 and 13 also show the importance of the difference in electric conductivity between the front end and the rear end. The examples of the preferred embodiments had reduction of preferential corrosion in the welding portion, as compared to the comparative examples.

With regard to the original limitations of Claims 2 and 7, applicants note that there is no disclosure in the cited references of performing a slow cooling in between a first higher maintained temperature, and a second lower maintained temperature. In Claim 2, for example, the controlled cooling is performed in between the first maintained temperature of 500-630 degrees and the second maintained temperature of 400-500 degrees. In contrast, the cited art homogenization processes use a controlled cooling process down to a certain lower temperature, but do not maintain that lower temperature for 4-48 hours as recited in Claims 2 and 7.

To further define the subject matter of Claims 2-4 and 7-9 over the prior art of record, these claims have been amended to recite that the processing steps are performed such that that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1.0 IACS%. The cited art does not teach or suggest the conductivity difference limitation of less than 1.0 IACS%. This electrical conductivity property is affected by

the homogenization process, as well as the temperature of the extruded material, the extruding speed, the cooling rate after extrusion, and the extruding ratio (proportion of sectional areas before and after extrusion). No teaching or suggestion to control the processing steps to produce this result is taught or suggested in the prior art of record. Although one of skill in the art would be able to produce such a material using the claimed process in conjunction with the teachings of the specification as filed, the various parameters involved make it improper to conclude that this limitation is inherent in the materials produced according to the processes of Wade, JP '346, or the other prior art of record.

Accordingly, Applicant maintains Claim 2-4 and 7-9 are patentable over Wade, JP '645, "Metals Handbook: Desk Edition, Gullotti, and JP '346.

Allowable subject matter

Applicant notes with appreciation the Examiner's indicated allowability of the subject matter of Claims 5 and 10 if rewritten to overcome the 112 rejections. Therefore, Claims 5 and 10 has been amended in accordance with the examiner's suggestions. Thus Applicant respectfully submits that claims 5 and 10 are now in condition for allowance, and such action is respectfully requested. Applicant respectfully submits the scope of Claims 5 and 10 has not changed as a result.

The Examiner asserted that the reasons for the indication of allowable subject matter were: the prior art of record does not teach or suggest a process for making an aluminum alloy hollow material (with the presently claimed composition) by a 2 step homogenization followed by cooling, substantially as presently claimed.

While Applicant agrees that the prior art of record does not teach or suggest a 2 step homogenization followed by cooling as recited in Claims 5 and 10, Applicant submits that this feature is not necessarily the sole basis of patentability of these claims.

New Claims

As indicated above, Applicant has added new Claims 11-22. Support for these claims is found in the specification, specifically in the original claim set and in Example 4 of the

specification. With respect to new Claims 19 and 20, these claims recite a homogenizing temperature of 400-460 degrees C. This is lower than the temperatures taught by the prior art currently cited by the Examiner. Applicant submits that these new claims also include a unique combination of features not taught or suggested by the prior art. Thus, Applicant respectfully submits that these claims are in condition for allowance, and such action is respectfully requested.

CONCLUSION

The applicant has endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. Accordingly, amendments to the claims pursuant to statutory sections 103 and 112, the reasons therefor, and arguments in support of the patentability of the pending claim set are presented above. In light of these amendments and remarks, reconsideration and withdrawal of the outstanding rejections is respectfully requested.

Any claim amendments which are not specifically discussed in the above remarks are not made for patentability purposes, do not narrow the claims, and it is believed that the claims would satisfy the statutory requirements for patentability without the entry of such amendments. Rather, these amendments have only been made to increase claim readability, to improve grammar, and to reduce the time and effort required of those in the art to clearly understand the scope of the claim language. Furthermore, the new claims presented above are of course intended to avoid the prior art, but are not intended as replacements or substitutes of any cancelled claims. They are simply additional specific statements of inventive concepts described in the application as originally filed.

If the Examiner has any questions which may be answered by telephone, he is invited to call the undersigned directly.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 12/06/02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 2-5 and 7-10 have been amended as follows:

2. (Amended) A process for producing an aluminum alloy hollow material, comprising ~~as set forth in claim 1, wherein~~:

homogenizing an aluminum alloy ingot containing ~~at least~~ about 0.3~~-~~ to about 1.5 wt% Mn ~~is subjected to a homogenizing treatment and thereafter the ingot is subjected to~~; and

port hole extruding ~~extrusion or port hole extrusion followed by drawing elongation processing~~ the ingot to produce a hollow material,

wherein said ~~in which the aforesaid~~ homogenizing ~~treatment~~ of the ingot is carried out by maintaining the ingot at a first ~~given~~ temperature of 500-630°C for more than zero but not more than about ~~0~~ 24 hours, ~~thereafter~~ cooling the ingot down to a second temperature of about 400-500°C at a cooling velocity of not more than 100°C/hr, and maintaining the ingot at said second temperature for about ~~this temperature for~~ ~~4~~ to 48 hours,

wherein the processing steps are performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1.0 IACS%.

3. (Amended) A process for producing an aluminum alloy hollow material, comprising ~~as set forth in claim 1, wherein~~:

homogenizing an aluminum alloy ingot containing ~~at least~~ about 0.3~~-~~ to about 1.5 wt% Mn ~~is subjected to a homogenizing treatment and thereafter the ingot is subjected to port hole extrusion or port hole extrusion followed by drawing elongation processing to produce a hollow material, in which the aforesaid~~;

wherein said homogenizing ~~treatment~~ of the ingot is carried out by raising ~~maintaining~~ the ingot to ~~at~~ a ~~given~~ temperature (T1) of 500-630°C, maintaining said ingot at said temperature T1 for more than zero but not more than about ~~0~~ 16 hours, ~~thereafter~~ cooling the ingot from the temperature T1 to 350°C (T2) at a cooling velocity of not more than 100°C/hr, wherein ~~whereby~~ the time ~~from after achieving to~~ between reaching the temperature T1 to reaching ~~becoming~~ the temperature T2 is maintained within 12-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a hollow material,

wherein the processing steps are performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1.0 IACS%.

4. (Amended) A process for producing an aluminum alloy hollow material, comprising ~~as set forth in Claim 1, wherein~~:

homogenizing an aluminum alloy ingot containing ~~at least~~ about 0.3 to about 1.5 wt% Mn ~~is subjected to a homogenizing treatment and thereafter the ingot is subjected to~~; and

port hole extruding ~~extrusion or port hole extrusion followed by drawing elongation processing~~ the ingot to produce a hollow material,

wherein said ~~in which the aforesaid~~ homogenizing ~~treatment~~ of the ingot is carried out by maintaining the ingot at a ~~given~~ temperature of about 400-500°C for 12-48 hours, and ~~thereafter~~ cooling the ingot down to room temperature,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1.0 IACS%.

5. (Amended) A process for producing an aluminum alloy hollow material, comprising ~~as set forth in Claim 1, wherein~~:

homogenizing an aluminum alloy ingot containing ~~at least~~ about 0.3 to about 1.5 wt% Mn ~~is subjected to a homogenizing treatment and thereafter the ingot is subjected to~~; and

port hole extruding ~~extrusion or port hole extrusion followed by drawing elongation processing~~ the ingot to produce a hollow material,

wherein said ~~in which the aforesaid~~ homogenizing ~~treatment~~ of the ingot is carried out by maintaining the ingot at a ~~given~~ temperature of 400-500°C for 0.5-4 hours, ~~thereafter~~ elevating the temperature up to ~~an another given temperature of~~ 550-630°C, maintaining the temperature for 0.5-4 hrs., ~~thereafter~~ cooling the ingot to 350°C at a cooling velocity of not more than 100°C/hr, and cooling the ingot from 350°C to room temperature at an optional cooling rate.

7. (Amended) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt% Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, comprising ~~is subjected to a~~:

homogenizing ~~treatment~~ the aluminum alloy ingot; and

~~and thereafter the ingot is subjected to~~ port hole extruding ~~type continuous hot extrusion method to extrude a pipe material~~ the ingot to produce a pipe material,

wherein said ~~in which the aforesaid~~ homogenizing ~~treatment~~ of the ingot is carried out by maintaining the ingot at a first ~~given~~ temperature of 500-630°C for more than zero but not more than about ~~0~~ 24 hours, ~~thereafter~~ cooling the ingot down to a second temperature of about 400-500°C at a cooling velocity of not more than 100°C/hr, and maintaining the ingot at said second temperature for about ~~this temperature for~~ 4 to 48 hours,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%.

8. (Amended) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt% Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, comprising ~~is subjected to a~~:

homogenizing ~~treatment and~~ the aluminum alloy ingot ~~is subjected to port hole type continuous hot extrusion method to extrude a pipe material, in which the aforesaid~~;

wherein said homogenizing ~~treatment~~ of the ingot is carried out by raising ~~maintaining~~ the ingot to ~~at~~ a ~~given~~ temperature (T1) of 500-630°C, maintaining said ingot at said temperature T1 for more than zero but not more than about ~~0~~ 48 hours, ~~thereafter~~ cooling the ingot from the temperature T1 to 350°C (T2) at a cooling velocity of not more than 100°C/hr, wherein ~~whereby~~ the time ~~from after achieving to~~ between reaching the temperature T1 to reaching ~~becoming~~ the temperature T2 is maintained within 12-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a pipe material,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%.

9. (Amended) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt% Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, comprising ~~is subjected to a~~:

homogenizing ~~treatment~~ the aluminum alloy ingot; and

~~and thereafter the ingot is subjected to~~ port hole extruding ~~type continuous hot extrusion method to extrude a pipe material~~ the ingot to produce a pipe material,

wherein said ~~in which the aforesaid~~ homogenizing ~~treatment~~ of the ingot is carried out by maintaining the ingot at a ~~given~~ temperature of about 400-500°C for 12-48 hours, and ~~thereafter~~ cooling the ingot down to room temperature,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%.

10. (Amended) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt% Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, comprising ~~is subjected to a~~:

homogenizing ~~treatment~~ the aluminum alloy ingot; and

~~and thereafter the ingot is subjected to~~ port hole extruding ~~type continuous hot extrusion method to extrude a pipe material~~ the ingot to produce a pipe material,

wherein said ~~in which the aforesaid~~ homogenizing ~~treatment~~ of the ingot is carried out by maintaining the ingot at a ~~given~~ temperature of 400-500°C for 0.5-4 hours, ~~thereafter~~ elevating the temperature up to ~~an another given temperature of~~ 550-630°C, maintaining the temperature for 0.5-4 hrs., ~~thereafter~~ cooling the ingot to 350°C at a cooling velocity of not more than 100°C/hr, and cooling the ingot from 350°C to room temperature at an optional cooling ~~rate~~velocity.